

**WHAT IS CLAIMED IS:**

1. An ink jet ink composition comprising water, a humectant, and polymer-dye particles, wherein said polymer-dye particles comprise a colorant phase containing a water insoluble dye, and a polymer phase, said particles being associated with a co-stabilizer.
2. The ink jet ink composition of Claim 1 wherein the co-stabilizer is clay, silica, or an inorganic metal salt, hydroxide or oxide; a starch, a sulfonated cross-linked organic homopolymer, a resinous polymer or copolymer, hexadecane, cetyl alcohol, or any steric hydrophobic stabilizers.
3. The ink jet ink composition of Claim 1 wherein the co-stabilizer is hexadecane, cetyl alcohol, or a steric hydrophobic stabilizer.
4. The ink jet ink composition of Claim 1 wherein the water insoluble dye has a solubility of less than 1 g/L in aqueous media.
5. The ink jet ink composition of Claim 1 wherein the water insoluble dye is a xanthene dye, anthroquinone dye, methine or polymethine dye, merocyanine dye, azamethine dye, azine dye, quinophthalone dye, thiazine dye, oxazine dye, phthalocyanine dye, mono or poly azo dye, or metal complex dye.
6. The ink jet ink composition of Claim 1 wherein the water insoluble dye is an azo dye or a metal complex dye.
7. The ink jet ink composition of Claim 6 wherein the azo dye is an arylazoisothiazole dye.

10017729.124101

8. The ink jet ink composition of Claim 6 wherein the metal complex dye is a transition metal complex of an 8-heterocyclazo-5-hydroxyquinoline.

9. The ink jet ink composition of Claim 1 wherein the composite polymer-dye particles have a particle size of less than 1  $\mu\text{m}$ .

10. The ink jet ink composition of Claim 1 wherein the composite polymer-dye particles have a particle size of less than 200 nm.

11. The ink jet ink composition of Claim 1 wherein the composite polymer-dye particles have a mean size of less than about 200 nm and the polymer phase has a molecular weight of greater than about 5000.

12. The ink jet ink composition of Claim 1 wherein the polymer phase has a molecular weight of greater than about 10,000.

13. The ink jet ink composition of Claim 1 wherein the ratio of the colorant phase to the polymer is phase is from about 10:90 to about 90:10.

14. The ink jet ink composition of Claim 1 wherein the polymer-dye particles are made by a process comprising, in order:

- I) forming a colorant mixture comprising a water insoluble dye and an organic medium containing at least one ethylenically-unsaturated monomer;
- II) combining said colorant mixture with an aqueous mixture comprising a surfactant and a co-stabilizer to form a colorant mixture/aqueous mixture;
- III) causing the colorant mixture/aqueous mixture to form a stable aqueous droplet mixture via strong agitation; and
- IV) initiating polymerization to form composite polymer-dye particles comprising a colorant phase and a polymer phase;

wherein an addition polymerization initiator is added prior to initiating polymerization.

15. The ink jet ink composition of Claim 14 wherein the co-stabilizer is clay, silica, or an inorganic metal salt, hydroxide or oxide; a starch, a sulfonated cross-linked organic homopolymer, a resinous polymer or copolymer, hexadecane, cetyl alcohol, or any steric hydrophobic stabilizer.

16. The ink jet ink composition of Claim 14 wherein the polymer formed is a homopolymer.

17. The ink jet ink composition of Claim 14 wherein the polymer formed is a cross-linked polymer and the organic medium contains a mixture of ethylenically-unsaturated monomers comprising:

- a) at least one ethylenically-unsaturated monomer being free of ionic charge groups and being capable of addition polymerization to form a substantially water-insoluble homopolymer; and
- b) at least one ethylenically-unsaturated monomer capable of being a cross-linker.

18. The ink jet ink composition of Claim 14 wherein the polymer formed is a copolymer containing at least one ethylenically-unsaturated monomer being free of ionic charge groups and being capable of addition polymerization to form a substantially water-insoluble homopolymer.

19. The ink jet ink composition of Claim 14 wherein the water insoluble dye has a solubility of less than 1 g/L in aqueous media.

20. The ink jet ink composition of Claim 14 wherein the water insoluble dye is a xanthene dye, , anthroquinone dye, methine or polymethine dye,

merocyanine dye, azamethine dye, azine dye, quinophthalone dye, thiazine dye, oxazine dye, phthalocyanine dye, mono or poly azo dye, or metal complex dye.

21. The ink jet ink composition of Claim 14 where the water insoluble dye is an azo dye or a metal complex dye.

22. The ink jet ink composition of Claim 14 wherein the addition polymerization initiator is an azo initiator, a peroxide initiator, a persulfate initiator or a redox initiator.

23. The ink jet ink composition of Claim 14 wherein the composite polymer-dye particles have a particle size of less than 1  $\mu\text{m}$ .

24. The ink jet ink composition of Claim 14 wherein the composite polymer-dye particles have a mean size of less than about 200 nm and the polymer phase has a molecular weight of greater than about 5000.

25. The ink jet ink composition of Claim 14 wherein the polymer phase has a molecular weight of greater than about 10,000.

26. An ink jet printing method, comprising the steps of:

A) providing an ink jet printer that is responsive to digital data signals;

B) loading said printer with an ink jet recording element comprising a support having thereon an image-receiving layer;

C) loading said printer with an ink jet ink composition comprising water, a humectant, and polymer-dye particles, wherein said polymer-dye particles comprise a colorant phase containing a water insoluble dye, and a polymer phase, said particles being associated with a co-stabilizer; and

D) printing on said image-receiving layer using said ink jet ink composition in response to said digital data signals.

27. The ink jet printing method of Claim 26 wherein the polymer-dye particles are made by a process comprising, in order:

- I) forming a colorant mixture comprising a water insoluble dye and an organic medium containing at least one ethylenically-unsaturated monomer;
  - II) combining said colorant mixture with an aqueous mixture comprising a surfactant and a co-stabilizer to form a colorant mixture/aqueous mixture;
  - III) causing the colorant mixture/aqueous mixture to form a stable aqueous droplet mixture via strong agitation; and
  - IV) initiating polymerization to form composite polymer-dye particles comprising a colorant phase and a polymer phase;
- wherein an addition polymerization initiator is added prior to initiating polymerization.

10017729.1.24101